Environmentally Preferred Advanced Generation (EPAG) Technologies And Distributed Energy Resources

Internal combustion engines (ICEs) are the most mature distributed energy resource. ICEs have been used extensively for standby and emergency power. Over the past few summers banks of diesel engines have been used for reliability purposes by some utilities during summer peak demand periods. ICEs have limited applicability for longer duty cycles because of their atmospheric emissions. However, they have demonstrated the value of modular fossil-fueled distributed generation systems that can be installed quickly near load centers. The PIER EPAG Program is supporting the development of modular technologies that can meet California's environmental requirements. Fuel cells, advanced gas turbines, microturbine generators, advanced ICEs, and fuel cell/turbine hybrids have the potential to be sited at residential, commercial and industrial sites throughout California.

Combinations of EPAG and renewable energy technologies have the potential to be installed as "mini-grids" close to demand centers while meeting requirements for high reliability, dispatchability and green power. EPAG technologies are capable of using different and alternative fuels such as methanol, ethanol, biogas, and gasoline. Fuel cells and microturbines are being developed for vehicle applications. The use in vehicle applications presents opportunities both in terms of synergistic technology development and demonstration and in mass production and reduced capital cost.

Partnerships for Developing Distributed Energy Systems

The EPAG Program funds collaborative RD&D with the Electric Power Research Institute (EPRI) and the Gas Technology Institute (GTI). Both organizations have long-term experience in managing utility-sponsored research.

PIER Distributed EPAG Energy Projects

The EPAG program has funded 13 projects for $10.5 million to promote distributed energy resource development. Projects include:

- Demonstration of the performance of a molten carbonate fuel cell (MCFC) system, a MCFC stack, and a solid oxide/microturbine hybrid system. Hybrid sytems have the potential for 70 percent fuel-to-electricity conversion efficiency.
- Development of a novel steam reforming reactor for hydrogen production. Improved reformer performance will make fuel cells more attractive for distributed generation.
- Development of a pilot burner that permits the use of natural gas in a diesel engine. The reliability, durability and low cost of diesel engines will be combined with the low emissionf from natural gas combustion.
- Development of computer simulations for fuel cell and fuel cell-microturbine hybrid systems. Computer simulations will guide hardware design and will replace some expensive physical testing with lower cost computer simulations.
- Development of testing and reporting procedures for microturbine performance determination. Potential users will receive unbiased and uniform test results for comparing competing product offerings.

Opportunities for PIER Environmental Funding

The PIER EPAG staff is preparing a solicitation for fuel cell and microturbine technology development and demonstration. The staff will be looking for strong teams to provide innovative technological solutions to the issues that limit the widespread introduction of these two technologies in California. Proposals should have a clear market connection both in the scope of work and in the composition of the project team.